Precis archesia ugandensis (Lep.: Nymphalidae): A New Subspecies

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Precis archesia Cramer is widely distributed throughout east, central and southern Africa. The adult butterfly exhibits extreme seasonal polyphenism and several phenotypes have been described: f. *archesia* Cramer 1782, f. *pelasgis* Godart 1823 (Figs. 7-8), f. *chapunga* Hewitson 1864, f. *staudingeri* Dewitz 1879 (Figs. 9-10), f. *semitypica* Aurivilleus 1898, f. *inornata* Neustetter 1916, f. *coryndoni* Rothschild 1918, f. *obsoleta* Joicey & Talbot 1921 (Figs. 11-12). Form *frobeniusi* Strand 1909 is the subject of a separate paper. Until now the species had not been subdivided.

Descriptive

Precis archesia **ugandensis** ssp. nov.

Holotype ♂ 16.x.1967 Kisubi, Entebbe, Uganda. H. Falke leg.
Allotype ♀ 16.x.1967 Kisubi, Entebbe, Uganda. H. Falke leg. (presently to be donated to the British Museum (Natural History)).
Paratypes: 20 ♂ and 20 ♀. All in coll. L. McLeod.
Distribution: Uganda. Noted localities in Uganda are Labwor Hills, Mabira, W. Elgon, Mulange, Jinja and Entebbe (van Someren 1960).
Sudan: Imatong Mts. and Didinga (Hale-Carpenter 1928). Kajaka, Bwengwe, Kajokaji and Lotti Forest.

The subspecies is characterised by being slightly smaller in size than the nominative race. The average winglength of ssp. *ugandensis* is 2.4 cm and that of the nominative race 3.2 cm. Both fore and hindwings of *ugandensis* are more rounded than f. *pelasgis* of the nominative race and the slight tail-like protuberance or hook at the extremity of vein 1b of the hindwing is here almost lacking. The post discal bar of the upperssides of both fore and hindwings are more orange than those of f. *pelagis* of the nominative race. The orange colour of the post discal bars of Sudanese specimens is even deeper. This character is more apparent in fresh specimens. The post discal bars of worn or old specimens are often a pale cream colour in both subspecies. Examination of ♂ genitalia has shown no constant differences between subspecies, although in a high proportion of *ugandensis* the terminal portions of the valvae are somewhat shortened.

Although common in Uganda, all specimens taken there have been of f. *pelasgis* and f. *semitypica,* the latter being extremely uncommon. Examination of many collections including those of the British Museum (T. H. E. Jackson, V. G. L. van Someren, and Rothschild Collections); Muséum Nationale, Paris; the Booth Museum, Brighton (Hall Collection of Nymphalidae); Cambridge University; and the National (Coryndon) Museum, Nairobi, Kenya, has failed to produce

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any Ugandan specimens of forms other than *pelasgis* and *semitypica*. Correspondence with numerous lepidopterists has also confirmed this fact, e.g. Carcasson 1968, Falke 1967. Apparently the seasonal forms *archesia, chapunga, staudingeri, coryndoni,* and *obsoleta* are lacking in *ugandensis*. This may indicate a different genotype to that of the nominative race, perhaps an adaptation to the more or less constant climatic conditions of Uganda and southern Sudan.

The lack of extreme seasonal polyphenism in *P. archesia ugandensis* is not surprising if one examines the meteorological data of Entebbe, a locality in which this insect is common (Table 1). The monthly mean maximum and mean minimum temperatures vary little and rarely is the difference between maximum and minimum more than 10°C. The monthly mean hours of sunshine per day remains fairly constant,as does the relative humidity. Uganda being situated on the equator has a constant twelve hour photoperiod.

Few *P. a. ugandensis* have been collected in the Sudan. Hale-Carpenter collected 46 specimens of f. *semitypica* and 2 f. *pelasgis* at Didinga in December 1925, and Kent-Lemon collected 8 f. *pelasgis* in the Imatong Mts. in June-September 1919 (Hale-Carpenter 1928). Two specimens collected by Hale-Carpenter, kindly loaned by the Hope Department of Entomology, University of Oxford, are similar to the specimen illustrated in Figs. 5-6 but the discal bars of the underside are much narrower, being greatly invaded by brown pigment. In the British Museum collection are some specimens labelled "Joicey Bequest 1934 — 120" collected in Kajaka, Bwengwe and Kajokaji. Another specimen is labelled Lotti Forest, mid-December 1938.

No difference between larvae of ssp. *ugandensis* and ssp. *archesia* can be seen. The larvae are dark brown with fine white spotting and are typical of the genus in posessing longitudinal rows of spined elongated protuberances and two long, spiny horns covered with moles on the head. The description by Pinhey (1949) agrees with larvae from Kenya and Uganda.

As noted by Clark & Dickson (1957) in *P. octavia* Cramer, the larvae of *P. archesia* may have from five to seven instars, but unlike those of *P. octavia,* larvae of *P. archesia* do not exhibit polymorphism or polyphenism.

Experimental

Since 1964 when I first became interested in the seasonal polyphenism exhibited by certain species of the genus *Precis,* several African species have been the subjects of my special attention. *P. archesia,* because of its extreme seasonal polyphenism, was one of the species with which I carried out experiments to determine which of the environmental factors induce the variation of pigmentation and wingshape.

The earlier experiments with *P. archesia* did not lead to many conclusions because of the difficulty in obtaining adequate supplies of living insects. However, it was shown in 1966 that seasonal polyphenism in *P. archesia* from Kenya was not in-

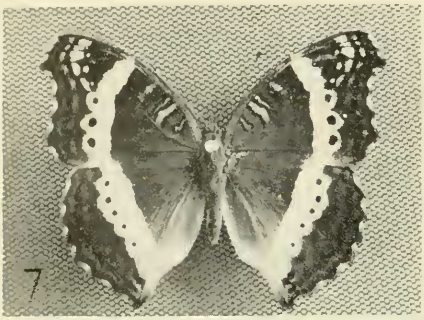
TABLE 1

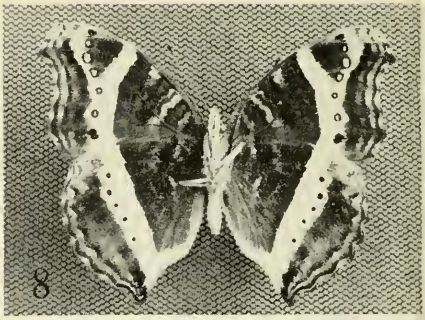
METEOROLOGICAL DATA FROM THREE LOCALITIES IN WHICH *PRECIS ARCHESIA* IS FOUND

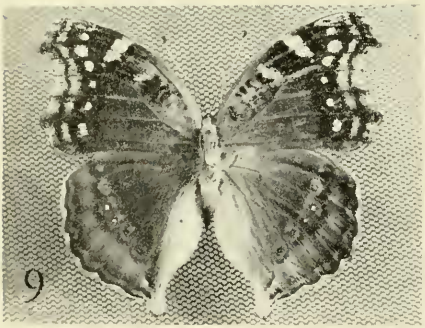
MEAN TEMPERATURES IN °C (taken from approximately 25 years)

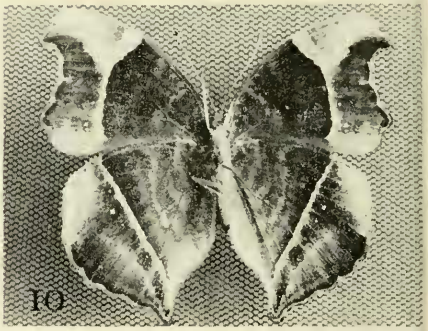
	Didinga Sudan		*Entebbe Uganda*		*Karen, Nairobi Kenya*	
Month	*Max.*	*Min.*	*Max.*	*Min.*	*Max.*	*Min.*
January	24.0	15.2	26.8	16.8	25.6	15.0
February	23.7	15.1	26.8	17.1	27.8	6.1
March	24.6	15.8	26.7	17.9	28.9	10.0
April	22.6	15.4	25.9	18.0	28.3	11.1
May	21.2	14.5	25.5	17.8	27.8	10.6
June	21.0	13.7	25.3	16.9	27.8	5.6
July	19.3	13.5	24.9	16.1	25.6	5.0
August	19.5	13.2	25.1	16.2	25.6	4.4
September	21.2	13.4	25.9	16.4	27.8	5.6
October	22.4	14.2	26.2	17.0	27.8	7.8
November	23.0	14.3	26.2	17.3	24.4	12.2
December	23.2	14.5	26.1	17.1	25.6	11.1
	P. a. ugandensis		*P. a. ugandensis*		*P. a. archesia*	
	f. *pelasgis* common		f. *pelasgis* common		f. *pelasgis* common	
	f. *semitypica* rare		f. *semitypica* common		f. *semitypica* common	

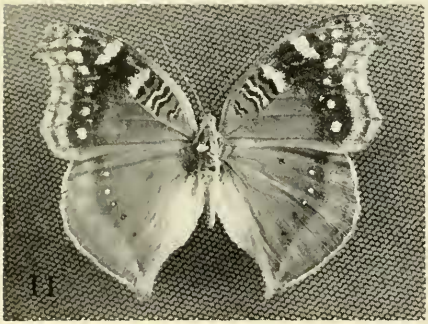
PLATE IX

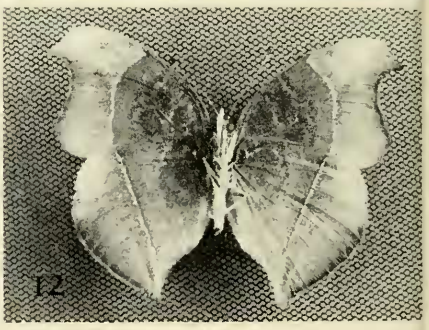












Precis archesia archesia

Left—Upperside. Right—Underside.

7 and 8. f. *pelasgis* God. Kenya.

9 and 10. staudingeri Dew. Tanganyika.

11 and 12. f. obsoleta J. & T. Angola.

duced by variation of relative humidity. In 1967 by giving larvae from Uganda and Kenya unlimited supplies of food, it was shown that difference in adult size between the two cultures was a constant character.

Following my return from Kenya to England in 1967, I continued to receive supplies of living *Precis* butterflies from contacts I had made while in East Africa. On 20th October 1967 I received by air mail several living *P. archesia* butterflies together with certain other species, which had been collected a few days previously at Kisubi, Entebbe, Uganda. A number of eggs had been laid in their containers. When caged with *Coleus forskohlii* under laboratory conditions, two females continued to lay eggs throughout October and until their death in mid-November. A total of 147 eggs were obtained. When maintained under optimum conditions 127 larvae achieved the second instar stage.

I had already concluded from my work on *P. octavia* that temperature is the environmental factor which induces seasonal polyphenism in that species. I considered that because the two species are closely allied, the same environmental factor would probably induce polyphenism in *P. archesia*. The 127 larvae were divided up into three batches of forty insects. Each batch was maintained under different constant temperature, all having the same constant 50% humidity and 12 hour photoperiod. The three temperatures were 27°, 21° and 16°C, a range which produces both extreme forms and intermediates of *P. octavia*. (It is a pity that I did not carefully examine natural climatic conditions in relation to the distribution of the various forms of *P. archesia* before choosing this temperature range. Lower temperatures would have given more interesting results.)

On emergence the adult butterflies did not show any of the variation normally characteristic of the nominative race (Plate IX), and all could be classified as f. *pelasgis*. However, some slight variations were noted. These variations are figured in Plate VIII and can be directly related to the different temperatures. The higher temperature of 27°C produced adults with black post discal spots lacking any pupils on uppersides fore and hindwings. The upperside forewings exhibited only traces of blue pigmentation of the submarginal band in spaces 4, 5 and 6. The central transverse bar of the cell was thick and bright orange. The borders of the transverse bars of the cell lacked blue pigmentation (Figs. 1-2). The lower temperature of 16°C produced adults with white pupils to the post discal ocelli of upperside fore and hindwings. The intensity of blue colouration of the submarginal band was increased, and blue borders were apparent to the transverse bars of the cell (Figs. 5-6). These latter specimens were approaching f. *semitypica*.

None of the insects bred at 16°C achieved the intensity of blue pigmentation found in a specimen taken on Mt. Elgon by H. Falke in 1967. The submarginal band and borders to the transverse bars of the cell are of a bright blue, and there are